DEVICE FOR HOLDING A LAPTOP COMPUTER IN A HARDSIDE COMPUTER OR ATTACHÉ CASE

BACKGROUND OF THE INVENTION

This invention relates to systems for holding a laptop computer case or similar relatively delicate instruments in a carrying case, specifically an attaché or computer carrying case. More particularly, this invention relates to a system that uses the clamshell type opening system that characterizes virtually all rigid or hardshell attache cases, and some hybrid type of such cases as well. Such rigid cases are usually called "hardside" cases although, as used in this document, hardside also embraces any cases that have a generally rigid peripheral frame that surrounds a pair of opposed, open shell constructions in which the user's laptop computer or the like can be placed for transport. It is understood that the shells themselves need not be entirely rigid, but can have textile or leather panels attached to and suspended by the respective rigid frames. These frames are hinged to one another along one edge or side of their general rectangular shapes.

In the past, laptop computers have been held in such cases by merely placing them within the main packing compartment and closing the clamshell opening. Also, the laptop computer could fit into a specially padded compartment provided within the shell-enclosed space. Sometimes a strap holds or embraces the computer, thus fixing the computer in position. Foam pads, usually attached to the frame or the sides of the case, extend around and engage the edges and sides of the computer. These systems tend to be bulky, cumbersome, difficult to use to the extent that sometimes the user either fails to fasten the straps to secure the computer, or removes the padding, etc. Failure to use these securing systems could result in

damage to the computer if the case containing the laptop computer suffers some abuse, for example, falling from a desk or out of the hands of the traveler. The laptop computer can crash to the side of the case, sometimes breaking the more delicate components of the computer.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the invention to provide a system for a laptop computer carrying case with a clamshell type hinged opening that automatically grips the laptop computer when the clamshell opening is closed whereby the laptop computer can be held away from the sides of the case to help prevent damage should the case fall.

It is another object of the invention to provide a gripping device that moves from a closed position to an open position when the clamshell opening of the case is opened. In the open position, a laptop computer suspended therein can be easily withdrawn from the open clamshell case, but when the clamshell opening is closed, the gripping device engages the main surfaces of the computer to help prevent the computer from moving within the computer case when the computer case is subject to physical forces.

Details of the invention will become apparent by referring to the preferred embodiments described herein.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows a perspective view of a type of clamshell type carrying case especially useful in the subject invention.

Figure 2 is a partial perspective view of the closed case lying on one shell with the textile panels and latch console removed to show a laptop computer gripping system.

Figure 3 is a side view of the closed case standing on its glides.

Figure 4 is a view similar to that of Figure 3 with the clamshell frames partially open.

Figure 5 is a top view of Figure 4.

Figure 6 shows this embodiment with the clamshell frames almost shut.

Figure 7 is a perspective cross-sectional view of a second embodiment of the system holding a laptop computer.

Figure 8 is the cross-sectional view similar to Figure 7, but as seen from an end of the case.

Figure 9 is a close up perspective view of the gripping mechanism with the gripping bar shown in dashed lines.

Figure 10 is a cross-sectional view of the mechanism shown in Figure 9.

Figure11 is a perspective cross-sectional view of the end cap and extra lever.

Figure 12 is a front view of the end cap.

Figure 13 is a rear view thereof.

Figure 14 is another embodiment for adjusting the position of the gripping bar.

Figure 15 shows a pair of fixed bars mounted to the edge of the base shell molded frame.

Figure 16 is a closer view thereof.

Figure 17 is close-up view detailing the foam cushion, end cap and extra arm, and the stay arms.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The figures show three variations on the inventive mechanism of gripping a laptop computer. The first provides a movable tray to grip and hold the computer beneath a movable gripping bar. The second embodiment substitutes a fixed, broad gripping bar for the moving tray to grip one face of the laptop computer. A pair of bars identical to the movable gripping bar could replace this broad bar. Unlike the tray of the first embodiment, these bars are fixed to the sides of the base shell's rigid frame. The third embodiment is similar, but provides superior gripping over a wide range of laptop computer case thicknesses.

All of these gripping systems are preferably installed in the type of luggage case 1 shown in PCT publication WO 01/28381 assigned to Samsonite Corporation, the assignee of the subject invention exemplified in Figure 1. This type of case construction comprises a pair of injection-molded frames 13, 13 into each of which a textile panel 3 is integrally molded and autogenously attached to form two main faces of the case. The resulting case is remarkably light and the molded frames provide secure clamshell style access opening when the latches7 are closed. As can be seen from the drawings, this case includes a pair of stays 14 for holding the hinged shells in the open position when desired by using various spring biased clutch mechanisms. These stays also include a gravity sensing mechanism of the type shown in U.S. Patent 4,714,286 to Yamamoto, also assigned to Samsonite Corporation. Although this gravity sensing stay mechanism is not central to the disclosed gripping system, it is desirable to have such a lid stay arrangement that can position the lid shell in either a fully opened position or partially opened position. Other conventional construction details include integrally molded hinge 8, separately molded console 9 with its carry handle 6, glides 11,

interior space 4 into which a computer or other things may be put, and interengaging lips or edges 5, 5' of the frames.

At a minimum, these gripping systems require a relatively stiff frame for applying a leverage force from the case's latch closure, through the frame and hinge, to the gripping members of the disclosed gripping system, which in turn grip the main faces of the computer case. These embodiments each include a bar 16 and a tray 18 or other bars 20, 20, each of which span the full width of the case interior from one side of the stiff frame to the other. This feature transfers the closing force from the clamshell frame to the gripping members, as will be detailed, and hence to the flat faces of the laptop computer to be gripped, without applying pressure directly to the insides of the relatively flexible panels which form the main outside shell faces. This feature is especially desirable when the inventive gripping system is installed in the types of clamshell cases shown in the PCT publication WO01/28381 incorporated herein. But the advantages of the disclosed system can apply to other clamshell case constructions as well.

Referring to the first embodiment, the construction includes a laptop support tray 18 consisting of generally quarter circle shaped flat plates 19 standing up from and flanking an integrally formed broad, stiff central plate 21. The laptop computer "L" to be gripped rests between the quarter circle plates on this central plate. These quarter circle plates are adjacent the stay mechanisms just inside the frame sides near the hinge 8. The lower stay arm is attached to the lower frame by an axle pin 15. This axle pin also suspends this tray to the side of the case via plates 19 and 19, as well as forms the axis about which the tray pivots slightly during opening and closing the clamshell frames. The upper stay arm has a similar axle pin 15 affixing its end to the upper shell frame. The enlarged ends of the upper and

lower stay arms are hinged to one another. These enlarged ends contain the gravity sensing latch or a more conventional spring biased clutch mechanism as noted above. These mechanisms hold the frames, and thus the upper and lower shells, open for convenient access to the interior of the case, and in particular permit easy access to the laptop computer. An extra lever arm 17 shares this lid shell mounted axle pin. One end of this lever arm supports an end of the gripping bar. The other end of the lever arm connects the upper corner of the quarter circle plate at a rivet 12 adjacent to the upper stay axle pin. The gripping bar extends to a substantially identical construction at the stay mounted on the other side of the case. This gripping bar consists of a rigid extrusion with a very high friction material along at least the side intended to grip the laptop computer. The gripping bar has a constant oval cross sectional shape with the narrow end 22 of the oval shape pointing towards and adjacent to the hinge line of the case (see Fig. 17 for example). This gripping bar could be spring biased as will be detailed so that this narrow end tends to squeeze down on the laptop computer harder than the front edge.

In operation, the laptop computer rests on the tray and is thus mostly contained in the base shell of the computer case. The lid shell starts in the open position, either partially or fully (i.e. substantially at right angle to the base shell) with the stays in the open position. The stay arms thus have raised the bar and tilted the tray, holding the front edge of the laptop computer slightly raised from base shell wall (see Fig. 5). In this position the user has easy access to the laptop computer, whether the case is lying flat on a desk with the clamshell opening in the fully open position or whether the case is being held vertically with the gravity sensing stay holding the lip shell at an acute angle to the base shell as in Fig. 6. In any event, when the lid shell is moved to the closed position, the tray pivots counter clockwise (as viewed in Fig. 2). This places the laptop computer relatively flat within the interior space 4

of the base shell. Simultaneously the extra lever arm 17 moves the gripping bar 16 down so that its narrow edge 22engages against the upper surface of the laptop computer. Depending on how thick the laptop computer is, this tail end will be forced to move further counter clockwise in response to the thickness of the computer. It should be understood, of course, that the upper surface of the tray is also a high friction material so that it too grips the laptop computer when the gripping bar pushes down on the computer as the lid closes. Once the lid is fully closed, the latches 7 (Fig. 1) hold closed and thus the lid is held closed against the upward force of the bar against the laptop computer.

This system is very effective for gripping the laptop computer and preventing it from crashing around inside the case. The case includes a conventional cushioning pad 23 fixed to the case along the inside of the hinge between the computer and the hinged sides of the frames keeps the laptop computer isolated from the bottom of the case (see Figures 15, 16, and 17). Thus, the computer's movement is resisted in all other directions by the firm gripping between the computer and the upper gripping bar and the high friction material on the upper surface of the tray. Note that if the computer case falls on its upper side (the side opposite the hinge), the gripping bar cams even more firmly against the laptop computer. It is well known that the frictional force between the contacting surfaces of objects is directly proportional to the force perpendicular to the contacting surfaces. Thus the tendency of the gripping bar to rotate to tighten its grip on the laptop face occurs just when the computer needs to be more firmly gripped, such as when the case falls on its upper edge. Also, this elongated cam shaped bar provides an eccentric movement so that it can hold a range of laptop computer thickness, particularly between 2.5 cm and 5 cm thick laptop computer. Again this is accomplished merely by the elongated trailing edge 22 of the bar rotating towards or away from the computer as a function of the computer's thickness dimension.

The second embodiment is mechanically similar to the first but, for several reasons has been found to be superior. Here, the tray is replaced by one or more fixed friction bars 20 similar to the eccentric gripping bar (Figures 15, 16, and 17). These extend across the bottom shell of the case where screws fasten these bars to the frame structure via the molded end caps 24 shown. Since this bottom support does not move, there is no need to attach these bars to the lower stay armaxle pin 15, nor to a lever arm 17 operated by the upper stay as in the first embodiment.

Each end of the upper gripping bar 16 is supported by the upper stay axle pin, preferably bya second lever arm 26 that rotates and translates the gripping bar as the stays move in response to opening and closing the case. The gripping bar consists of a hollow extrusion with web reinforcements to give it structural strength (see Figs. 7 and 8). End caps 28 insert into and around the end portions of the eccentric gripping bar. The end caps are injection molded to form a cavity that intimately engages these ribs and the outer oval contour of the gripping bar. Alternately these end caps could be molded to fit within hollow ends of the gripping rods. In some situations, this internal cap construction may be desired to assure a uniform gripping surface across the entire width dimension of the case interior. These end caps include a torsion spring 30, one end of which is embedded in the cap that in turn firmly grips the bar. The other end of the spring protrudes into a split axle 32 which protrudes into the eccentric arm 16. This torsion spring is preloaded to provide a clockwise axial rotation force (as seen in Figure 7) to the gripping bar. This tends to force the narrow, protruding edge 22 of the gripping bar down on the laptop computer to be gripped. Second lever arm 26 includes two keyhole shaped holes or mounting slots 27 that are sized to receive the protruding end 33 of the split axle. When in its uppermost position (that is the position furthest away from the

bottom shell), the gripping bar is properly positioned to engage a 3.5 to 4.5 cm thick laptop computer. Optionally or alternatively, the split axle can be pre-mounted in the alternative keyhole or mounting slot 27. In this mounting, the bar is closer to the base shell of the case, and is optimally located to grip a computer that is only about 2.5 cm thick. This versatility is relatively important since laptop computers tend to become thinner and thinner. Thus, the owner of this laptop gripping system can bring the case into a dealer for this upgrading so that it can operate with a thinner, presumably more up-to-date, laptop computer.

While a single, wide supporting bar 25 is shown in some of the figures, it should be understood that one could substitute the two bars 20 that are substantially identical to the lever mounted gripping bar. This would save molding costs and simplify stocking parts. As stated above, these lower bars are merely fixed to the frame at their ends, but could be attached to permit axial rotation to the lower frame to enhance their ability to accommodate a range of computer thicknesses as well as provide superior dynamic gripping when the case falls on its top edge. The wide bar 25 can be made stiffer and more robust, which could be advantageous in certain applications.

In the last embodiment shown in Figure 14, the extra arms have been replaced with a connector 34 with a range of several cavities 36 for receiving the gripping bar ends. As stated above, the extra bar of the earlier embodiment could move the gripping bar in a large arc to accommodate laptop computers with a relatively large range of thicknesses. Here, the user need only choose the correct cavity 36 in the socket connector for the particular thickness of the laptop computer to be gripped. This mechanism simplifies the apparatus by eliminating the need for the eccentric arm of the first embodiment. The socket connection is affixed directly to the upper stay arm.

Clearly this invention encompasses various combinations of features shown individually in the three illustrative embodiments detailed above. For example, the adjustable socket shown in the third embodiment could be used with the movable tray taught by the first embodiment. Also, while the lower support bars in the second embodiment were fixed to the sides of the lower shell frame, they could also benefit from the spring biasing end caps 28 shown in Figures 10 through 13. Also, the spring biased gripping bar of the second embodiment could be mounted directly to the upper stay arm, thus eliminating the eccentric arms.

This scope of this invention should be assessed only with reference to our claims. There are many variations to our preferred embodiments that are made obvious by this disclosure. For example, this invention has been illustrated by a particular type of luggage case construction with molded structural frame members that pivot to open and close using a conventional mechanical hinge along one edge. A hinge made of textile or polymer to form a "living hinge" would work almost as well. Also, one or both shells could be made using more conventional softside construction techniques so long as relatively rigid, mutually hinged and latched frame sides are available to mount and operate the type of clamping apparatus disclosed. Also, while the extra bars in the second and third embodiments are separately formed and mounted to the upper stay arm, the upper arms could be molded to integrally form these arms and their mounting slots for the gripping arm end caps. Also while the gripping bars are shown having a constant cross- sectional half circle shape, other cross sectional shapes will work that can be eccentrically mounted to provide the desired incremental or camming grip.